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Case Report

Periodontitis subject with failing dentition and management with cross arch bridge and implants

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ABSTRACT

Severe periodontal disease often leads to tooth loss, necessitating prosthetic rehabilitation to restore function and aesthetics. The concept of perio-prosthetic treatment using extensive bridges of cross-arch design was introduced approximately 30 years ago. Long term follow-up studies have shown that teeth with reduced periodontal support can be used as abutments for extensive fixed prostheses, provided periodontal disease had been treated successfully and an effective recall program had been instituted to prevent periodontal disease recurrence. Implants along with cross arch bridges in controlled periodontitis subject have never been used together for complete full mouth rehabilitation.

Keywords: Perio-prosthetic management, Implants, Periodontitis, Bridge

INTRODUCTION

Characteristics of chronic periodontitis are progression and destruction of periodontal tissues, often associated with a risk of disease relapse. A combination of a compromised remaining dentition and the risk of a relapse of the periodontal disease, rendering supporting teeth at a hazard of later loss, make the appropriate treatment and prosthodontic rehabilitation of patients with chronic periodontitis challenging. Stabilizing the periodontal disease is difficult but mandatory before any prosthodontic treatment can be performed. Restorations need to be designed in such a way that performance of oral hygiene procedures is not impaired and maintenance treatment is feasible. Prosthetic replacement is often necessary as part of the corrective therapy to restore function and aesthetics. Though such teeth cannot function individually due to the severe loss of periodontal support, yet once splinted they can survive for a considerable time, provided the periodontal infection is under control.[1]

CASE HISTORY

The patient, a 72 year old woman, had presented herself at the Faculty of Dental Sciences, Banaras Hindu University with complain of gingival bleeding, repeated abscess formation around the gums and several missing teeth. Her medical history was without any systemic involvement and she was not on any bisphosphonate drugs.

Oral examination

The gingiva was inflamed, and there were areas of spontaneous bleeding with attachment loss on all the remaining teeth. The occlusion was compromised as both upper and lower premolars were touching on either side with loss of anterior guidance. Teeth # 15,16,17,18, and 24,26,27 and 28 were absent in maxilla (Figure 1) and 32,31,36,41,42,46,47 were missing in the mandible (Figure 2). TMJ was normal without any abnormality of clicking or deviation. The bone loss of the remaining dentition was evaluated by orthopantanogram and 3D scan (Figure 3,4). Basic periodontal examination of treatment needs was done in each sextant. The patient's

maxillary and mandibular teeth were individually evaluated for their prognosis. Pockets of more than 3 mm were assigned pocket eradication therapy with curettage and root planning. Effective recall program was tailored for 1 week, 3 weeks and 5 weeks respectively to check oral hygiene status. The patient was given removable prosthesis and was evaluated for oral hygiene maintenance for the next six months.

Figure 1: Maxillary occlusal view.

Figure 2: Full dentition.

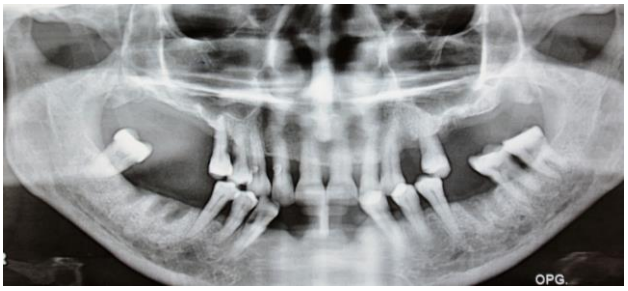

Figure 3: Preclinical OPG.

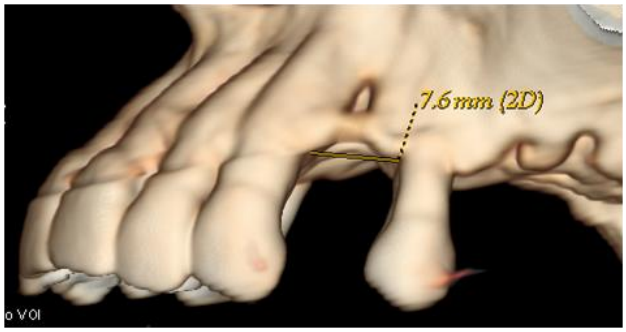

Figure 4: DentaScan maxilla 3D view.

Treatment planning

The full treatment procedure was explained to the patient and an informed consent was taken before the start of the procedure. The concept of cross arch bridge was followed for maxillary dentition, the root canal treatment was completed in most of the upper teeth as it is said that endodontic complications are most likely related to the trauma induced by the restorative procedures and can be as high as 15% on abutment teeth, as opposed to 3% loss of vitality of non-abutment teeth.[2] The bridge was planned using ten teeth with single cantilever on either side. There was symmetrical distribution of the abutment teeth, maxillary central incisors, canines and first and second premolars were used as abutments for a 10 unit bridge, this would be ideal to obtain optimal load distribution (Figure 5). Even contacts were established anteriorly as well as posteriorly, with freedom in centric occlusion. The occlusal morphology guided the masticatory forces in an axial direction. The palatal surfaces of the maxillary anterior teeth were given morphology to ensure axial load direction.[3-5] Prosthodontic concept of splinting teeth, especially abutments, evolved the need to compensate for increased crown root ratio. Splinting abutments may enhance stability and may shift the center of rotation and transmit less horizontal force to the abutments. The mandible had missing lower incisors along with bilateral posterior molars. According to the Misch treatment planning concept of available bone and implant treatment plans, two wide diameter implants can support four incisors as the force vectors are low in this region. Two implants, 3.75/10 mm in diameter were placed in incisor area, three 4.5/10 mm in width were used for posterior sites. The patient was allowed to wear the removable partial denture for the remaining healing period of three months. An OPG was taken post-operatively to check the position of the implants (Figure 6).

Figure 5: Symmetrical distribution of abutment teeth in maxilla.

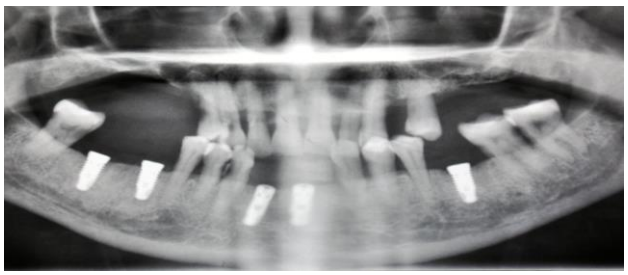

Figure 6: OPG after implants in mandible.

Prosthesis preparation

The attachment loss in maxillary teeth needed supra-gingival placement of the crown margins. The presence of long clinical crowns in healing periodontal dentitions, as a sequel of clinical attachment loss and/or pocket elimination periodontal surgery, was favorable in terms of retention and resistance form. Optimal retention was secured by almost parallel preparations of the abutment teeth (Figure 7). The preparations of the abutment teeth were refined and a working impression was made using heavy/light body addition cured silicone (Aquasil Ultra–Dentsply) in a custom acrylic tray. Metal try-in/jaw registration on semi adjustable articulator using Duralay resin (Reliance Dental Mfg. Co.) and porcelain try-in at bisque bake stage allowed refining the occlusion. The fixed bridge prosthesis of metal ceramic crowns with cantilevers on both sides of twelve teeth was cemented on eight abutments permanently using zinc phosphate cement (Phos-phaCem® IC, Ivoclar Vivadent AG, FL-9494 Schaan, Liechtenstein). Absence of papilla was disguised by giving high tooth contact position in the anterior region (Figure 8). The prosthesis for the anterior mandible was two implants replacing four incisor crowns of 6 mm width, in a bridge form and posteriors had hybrid prosthesis bilaterally as the patient decided to replace them with ceramic restorations after one year due to financial constraints (Figure 9). The contact with upper arch was minimal or no contact in centric relation but may be equal in centric occlusion because of cantilevered prosthesis in upper arch. Mutually protected occlusion with shallow anterior guidance was recommended for implants opposing natural dentition. In this occlusal scheme maximum intercuspation coincided with the optimal condylar position of mandible as the posterior teeth were in contact with forces being directed along their long axis. During lateral or protrusive movements, six anterior maxillary teeth, together with six mandibular teeth guide the mandible so that no posterior contacts occur (Figure 10,11). The final panoramic view of the completed case (Figure 12).

Figure 7: Preparation of teeth for cross arch bridge.

Figure 8: Maxillary bridge prosthesis.

Figure 9: Mandibular prosthesis.

Figure 10: Prosthesis in centric relation.

Figure 11: Prosthesis in centric occlusion.

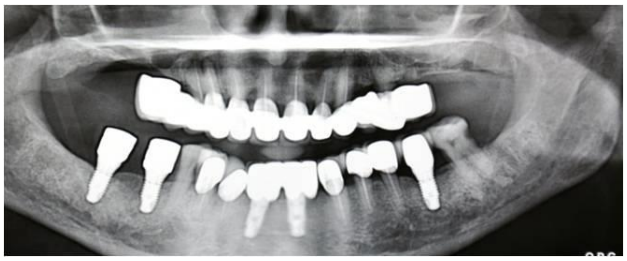

Figure 12: Final OPG.

DISCUSSION

The treatment of advanced periodontal disease was carried out in phases with non-surgical therapy followed by careful evaluation of the periodontal tissues after healing. Such comprehensive treatment can be provided to highly motivated patients willing and capable of maintaining a high plaque control. The maintenance of fixed dental prosthesis stability over time was achieved by precluding undue strain concentration on the

supporting apparatus; the progressive mobility of teeth was successfully avoided through rigid splint of the abutment teeth and correct occlusal design including incorporation of cantilever units. It should be pointed out that the abutment teeth with severely reduced but healthy periodontal tissue support still possess periodontal mechanoreceptors in the apical third of the root contributing to tactile sensitivity.[6] Fixed bridges of a cross-arch design provide a degree of rigidity and result in a more favorable distribution of the masticatory load along the entire arch, rather than on individual units, therefore preventing overloading of abutment teeth with reduced periodontal support.[7] Ante's concept ,the pericemental area of abutment teeth should be equal to or exceed that of the tooth or teeth to be replaced has been questioned, since it attaches more importance to the number of teeth to be replaced than to the amount of remaining periodontal tissues supporting the abutments. Hence, the bridge constructions were, Defiant to Ante's unproven postulation with construction of fixed partial dentures. Extensive cross-arch bridges by far not fulfilling the prerequisites of Ante's law have been successfully provided since 1970s as a means of rehabilitating periodontally compromised patients. Several long term follow-up studies have shown that fixed bridges can be placed and successfully maintained on a minimal number of abutment teeth with greatly reduced periodontal support, provided the prosthodontic treatment is: 1) preceded by adequate periodontal therapy and 2) followed by a plaque control programmed effective enough to prevent recurrence of periodontal disease.[8] If presumptive abutments are well distributed and periodontal infection is under control, as little as 20-30% of the original periodontal tissue support can be sufficient to carry fixed cross-arch bridges. Symmetrical distribution of the abutment teeth, e.g. a situation where maxillary central incisors, canines and second premolars are present and can serve as abutments for a 10 or 12-unit bridge, would be ideal to obtain optimal load distribution to the remaining periodontium. A maximum of two cantilever units may be incorporated bilaterally in cross-arch bridges, for functional and/or aesthetic reasons, provided certain prerequisites are fulfilled.[9] The study has highlighted that masticatory function could be established and maintained in subjects receiving fixed cross arch bridge on the abutment teeth with reduced but healthy periodontal tissues.

CONCLUSION

The patient was suffering from chronic periodontitis with severe attachment loss and mild mobility along with several missing teeth. In the present scenario, the patient had fixed prosthesis and the masticatory efficiency was increased considerably. The preservation of natural teeth in cross arch bridge was the best part of the treatment as the patient's original teeth were still present. The long-term success of cross arch bridge and dental implants prosthesis requires maintenance of plaque free environment and regular follow up.

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